THE FOREST TYPES OF MOUNT ELGON.

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Foreword.

The accompanying map is a compilation from Uganda Survey Department sheets and maps in possession of the Kenya Forest Department. I am indebted to Mr. G. Fairbairn of Mt. Elgon Forest Station for his amendments on the distribution of the forest types on the Kenya side, and to the Conservator of Forests of Uganda for permission to publish this paper.

Geographical Note.

Mt. Elgon, the Masaba of the Baganda and the Baguishu and the Terriet of the Sebei, is a large, ancient, solitary volcano. It is approximately fifty miles long from north to south, and, excluding the Nkokonjero " peninsula," about thirty miles broad. The " peninsula " is a ridge, about twelve miles long, and rising to over 7,000 ft., jutting out in a westerly direction from the main mountain towards Mbale. The summit of the mountain is the old volcanic crater. The rim has largely been worn away, but the odd remaining portions are in the neighbourhood of 14,000 ft. The highest point, Wagagai, 14,178 feet, is in Uganda, but Sudek, the boundary peak, is only some sixty feet lower. The bottom of the crater is at about 12,000 feet. The whole crater is drained by the boundary stream, the Suam. In the North and North-West the mountain slopes gently to 6,000 feet, but thence the fall is precipitous in places to the plains' level of about 3,500 feet. In the West and South-West, expecting the Nkokonjero " peninsula," the slopes are steep down to the general level of the Buguishu country, 4,000 feet to 5,000 feet. The slopes on the Kenya side, the East and the South, are far more gradual, though steep bluffs occur at the ends of lava flows. To the East the mountain falls away to the general level of the Trans-Nzoia at 6,500 feet. In the South the slopes are more prolonged as the general altitude of North Kavirondo is lower.

Climatic Note.

The prevailing winds are from the North-East, and having blown over Turkana and Suk are usually hot and dry, but that part of the mountain South-West of the Cherangani-Marakwet hills benefits from their interposition. Rainfall figures from places outside forests are not of great use in assessing rainfall within the forests. The Kenya Forest Station near Endebess at about 7,800 feet has had an average fall of 45 inches for the last 10 years. Assessing the fall from the forest types of the middle slopes I should say that North and North-East Elgon get a fall of about 40 inches, the East 45 inches, the South 50 inches, and the West including the Nkokonjero " peninsula " the neighbour-

hood of 60 inches. The main rainy reasons are in May and June and in November, but the only droughty time is from January to March. Being an isolated mountain deposition from mist and dew must be considerable. For reasons of clarity the very numerous streams coming off the mountain have not been shown in the accompanying map. It may be as well to state that the water supplies of a very large region are derived from the mountain and it is absolutely essential for this and climatic reasons to preserve the Elgon forests. No temperature figures are available. The crest of the mountain is well below the permanent snow line.

Forest Types.

To understand the present forest edge it is necessary to remember that the slopes of the mountain from Butandiga in the West round the North to Chemilil in the South-East were inhabited by cattle owning peoples who fired the grasslands regularly and gradually pushed back the forest edge. (The Masai removed themselves from the Trans-Nzoia on the rumour of the approach of Europeans.) The Baguishu in the South and South-West are cultivators, who before the advent of European vegetables and arabica coffee had little need to cultivate above 6,000 feet. Forest destruction from 6,000 feet to 7,000 feet must have been very recent.

The following tropical woody vegetational types on Dr. Burtt Davy's classification would appear to be present:—

Alpine elfin woodland,
Montane bamboo forest,
Upper montane rain forest.
Savanna woodland, and possibly
High montane conifer forest and Lower motane rain forest.

These headings are insufficient to describe adequately the composition of the Elgon forests, so I have sub-divided them as follows:—

1. Alpine Elfin Woodland.
   - (a) Upper moorlands.
   - (b) " Heath " zone.
   - (c) Upper bamboo transition forest.
2. Montane Bamboo Forest.
3. Upper Montane Forest.
   - (a) Mixed Pygeum forest.
   - (b) Lower bamboo transition forest.
   - (c) Malacantha forest.
   - (d) Malacantha and Entandrophragma forest.
4. High Montane Conifer Forest.
5. Savanna Woodland.

1(a). *Alpine Elfin Woodland—Upper Moorlands.*

This zone from 11,500 feet to the summit is characterised by the absence of all bush and tree growth, with the exception of the two arborescent *Senecios, Senecio gardneri* and *S. elgonensis.* The former species only occurs above 12,500 feet, but the latter certainly grows at 10,000 feet, and possibly below that altitude. Both species attain a height of 25 feet. The phallic-shaped *Lobelias,* though not woody, are remarkable. The vegetative form resembles a cabbage, but the robust flowering spikes are sometimes six feet tall. The shaggy *L. telekii* is widely spread above 11,000 feet, but *L. elgonensis* seems confined to swamps above 11,500 feet and to take the place of *L. aberdarica* at those altitudes. The low woody bush or herb, *Alchemilla argyrophylla,* is common in the lower part of this zone, more particularly in the crater. It is about one foot high only, but occurs in extensive masses. Small *Helichrysums* are common throughout.

1(b). *Alpine Elfin Woodland—" Heath " Zone.*

" Heath " is something of a misnomer, as the commonest and most striking woody plant is the Composite, *Stoebe kilimandscharica.* However as this is associated with heaths and is usually mistaken for one the name had better stand.

The upper and lower limits though shown on the map as 11,500 feet and 10,000 feet, are in reality far from well defined. Trees such as *Hagenia* often occur at 10,500 and even at 11,000 feet. They will be considered in the next zone. These lower moorlands are partially inhabited by a cattle and sheep-owing people, who are an administrative and forestal problem. The alpine bred cattle cannot survive at lower altitudes in tick-infested country, and the burning of the moorlands and forest glades for grazing is not in the best interests of the forest.

The chief woody constituents of this sub-formation are: *Stoebe kilimandscharica, Philippia johnstoni* (and/or *P. elgonensis* and *P. excelsa*), *Erica arborea, Anthospermum whyteanum, Senecio elgonensis,* and *S. amblyphyllus.* Both the heaths, the *Erica* and the *Philippia,* grow to thirty feet at their lower limit of the zone. The two tree *Senecios* when grown amongst thick heath are thin leaved. This character is retained at 9,000 feet (the lowest limit of the species, cf. *S. cheranganiensis*), where the species only grow in stream valleys and open swamps. The *Philippia* grows as a small bush at 11,500 feet, but the *Erica* fails at a thousand feet lower.

Among the woody herbaceous flora at the lower limit of the zone are: *Hebenstreitia dentata, Artemesia afra, Hypericum* spp., and *Nidorella vernonioides.*

1(c). *Alpine Elfin Woodland—Upper Bamboo Transition Forest.*

This zone is somewhat indefinite. Between 9,500 feet and 10,500 feet is something of a no-man's land, with " heaths," bamboo, and various timber species striving for dominance. One does not on Elgon emerge abruptly from bamboo forest into heathland, as one does in many parts of the Aberdares. In glades with a poor soil cover heath species are to be found as low as 9,000 feet. Normally the bamboo thins out above 9,500 feet, and small timber trees occur to a greater or lesser degree. The timber trees may be placed in two categories: one of those that thrive, and the other of those trees whose altitudinal optimum is much lower. In the first class are *Hagenia anthelmintica,* whose timber is of some merit, *Dombeya goetzenii,* which also grows quite happily at 7,500 feet, *Pittosporum abyssinicum, Cornus volkensii,* and less commonly *Faurea arborea* and *Agauria sailcifolia* var. *pyrifolia.* In the second class are *Podocarpus milanjianus, Olea hochstetteri, Pygeum africanum, Ilex mitis* var. *kilimandscharica,* and *Cassipourea elliottii,* but the commonest tree is undoubtedly *Rapanea neurophylla,* which is usually not more than 25 feet high.

2. *Montane Bamboo Forest.*

The bamboo, *Arundinaria alpina,* occurs on Elgon between 7,000 feet and 10,000 feet, but does not grow gregariously below 8,000 feet. Above 9,500 feet height growth falls off, and as stated above timber species are intrusive. It will be seen on the accompanying map that I have in the East shown the bamboo belt as between 9,000 feet and 10,000 feet. The bamboo is far less dense on this side of the mountain, and though it is to be found at 8,000 feet it occurs in clumps and patches and is by no means dominant. Bamboo must need a rainfall of over fifty inches to develop luxuriantly at this altitude. In the North the bamboo only occurs in restricted patches. In the South and West the bamboo belt is fairly " solid " from 8,000 feet. The plant is not a particularly attractive commercial proposition, but as a conserver of water supplies it is first class. Large timber trees are often to be found in the belt. In the north-east *Podocarpus gracilior* is not uncommon, but in wetter parts *Podo. milanjianus* is the commonest species. Timber trees occurring in the bamboo (often in groups) are: *Cornus volkensii, Dombeya goetzenii, Hagenia anthelmintica, Xymalos monospora, Cassipourea elliottii, Schefflera volkensii, Rapanea neurophylla,* and the small *Trichilia buchananii.*

Every fifteen years or so the bamboo flowers and dies. Though it dies in patches it happily does not do so all over the country as do some Indian species. Nevertheless the patches

are large enough to raise the ire of the uninitiated, who assign the cause to careless use of fire. These dead patches usually become covered with a strong growth of brambles, mixed with such species as *Hypericum leucoptychodes, Lobelia gibberoa,* and *Impatiens* spp. I imagine that the odd timber trees found in the bamboo seed themselves in this period.

3 (a). *Upper Montane Forest—Mixed Pygeum Forest.*

The change from the Malacantha forest (3c) is not so abrupt as I have shown on the map. The forest from Bulago to beyond Sipi is transitional. It is not so well marked as that between the *Ocotea* and coniferous forests on the Eastern Aberdares and on West Mt. Kenya, where stands of pole *Cassipourea elliottii* occur. That species is however plentiful. Other common species are *Albizzia gummifera* (the *Albizzias* do not go further north), *Ekebergia rueppelliana, Allophylus abyssinicus, Syzygium guineense, Pygeum africanum, Xymalos monospora, Casearia battiscombei,* and *Rapanea neurophylla.*

The typical forest from beyond Sipi to the Kiriki (Greek) river is good in parts. Excellent patches of the two most typical trees *Pygeum africanum* and the Elgon Olive, *Olea welwitschii,* are to be found. Other than these two species the commonest trees are *Ekebergia rueppelliana, Allophylus abyssinicus, Lachnopylis congesta, Dombeya goetzenii, Rapanea neurophylla, Podocarpus milanjianus, Olinia usambarensis, Teclea nobilis, Euphorbia* sp., *Neoboutonia macrocalyx,* and *Polyscias kikuyuensis.* At higher altitudes, from 8,500 feet and 9,000 feet, *Ilex mitis, Hagenia anthelmintica, Olea hochstetteri, O. chrysophylla,* and *Pittosporum abyssinicum* appear, but not in any quantities. Small trees and shrubs which occur are: *Halleria lucida, Scutia myrtina, Pavetta silvicola, Lasiosiphon lampranthus* (on rocks), *Gymnosporia* spp., *Dombeya nairobensis, Bersama abyssinica,* and *Catha edulis.*

The good cedar that is supposed by some to exist on this part of the mountain is a myth. Odd trees can be found in the Kaburon district to the north-east, but more particularly below the forest line. Within the forest, cedar, *Juniperus procera,* is commonest in the upper valley of the North Sit river. I imagine that if cedar forest ever occurred that it grew from 5,000 feet to 7,000 feet, and that it was burnt out by graziers very many years ago.

3(b). *Upper Montane Forest—Lower Bamboo Transition Forest.*

Malacantha, the Mwiruni of the Bagishu, does not grow usually above 7,500 feet. The transition zone (not shown on the map), lies between that altitude and the lower edge of the

bamboo, in the South and the South-West. In the South in the neighbourhood of the Lwakaka river there is a very striking stand of *Macaranga kilimandscharica,* but I do not know how far eastwards it extends. Associated with the *Macaranga* are *Conopharyngia holstii, Xymalos monospora, Allophylus abyssinicus,* and *Trichilia buchananii.* In the South-West and in the highest part of Nkokonjero the *Macaranga* though well represented is less obvious. The most striking plant is the tree fern, *Cyathea deckenii,* which occurs in patches on the hill slopes, thus demonstrating the heaviness of the rainfall in this part of the mountain. Bamboo occurs in restrained patches and the other trees to be found are: *Neoboutonia macrocalyx, Xymalos monospora, Hagenia anthelmintica, Pygeum africanum, Schefflera volkensii, Cassipourea elliottii, Trichilia buchananii,* and *Allophylus abyssinicus.*

3 (c). *Upper Montane Forest—Malacantha Forest.*

Malacantha sp. nr. *M. alnifolia* (late *Cola* sp., and *Sideroxylon adolfi-friederici*) is the Muna of the Akikuyu. It is a hygrophilous tree of large size, growing between 5,000 feet and 7,500 feet, and may represent one quarter of the stand of timber trees in some parts of this sub-formation. Associated trees are: *Syzygium guineense, Neoboutonia macrocalyx, Alangium chinense, Casearia battiscombei, Strombosia grandifolia, Pygeum africanum, Allophylus abyssinicus, Croton macrostachys, Polyscias fulva,* and/or *P. kikuyuensis, Albizzia gummifera, Conopharyngia* sp., *Schefflera abyssinica,* and less commonly *Fagara macrophylla, Bosquiea phoberos, Olea welwitschii, Ekebergia rueppelliana, Anthocleista* sp. (possibly *A. pulcherrima*), *Albizzia zygia,* or *A. grandibracteata, Podocarpus milanjianus,* and *Kigelia aethiopica.*

This type of forest stretches from the Sosia river in the South-East to near Sipi in the West. The nearer the sub-formation is to its lateral limits the more likely is it to be found confined to the lower slopes of valleys. A small area of forest on the northern slopes of the ridge, South of Kyesoweri, in N.E. Mt. Elgon, is included in this sub-formation. It must be a localised area of heavier rainfall. Elgon Olive and Pygeum are well represented but both the *Malacantha* and the *Casearia* are present. *Cassipourea elliottii, Allophylus abyssinicus, Ekebergia,* and the *Neoboutonia* are also common.

3 (d). *Upper Montane Forest—Malacantha and Entandrophragma Forest.*

This type of forest might conceivably be classified as Lower Montane, but as almost the only difference from 3(c) is the presence of a speices of *Entandrophragma,* a major difference in

classification would be silly. The *Entandrophragma* grows into a colossal tree, but does not appear to grow above 7,000 feet in altitude. The tree occurs in restricted localities, chiefly stream valleys, from the Muyembe valley in the North-West to Segururu hill in the South-West. This type of forest probably covered most of Bugishu at one period.

4. *Higher Montane Conifer Forest.*

This forest formation is characterised on Elgon by *Podocarpus gracilior*. Though this species occurs South of the Kererr (Samaki) river, below the forest line, the forest itself does not become coniferous until the northern slopes of the Bukwa valley are reached. The change is quite sharp. The Podo forest runs as far south as the Kibusi river. The other timber trees of this type of forest are: *Ekebergia rueppelliana,* which grows to a very large size; *Olea welwitschii,* in somewhat restricted localities; *Teclea nobilis, Celtis kraussiana, Olinia usambarensis, Lachnopylis congesta, Dombeya goetzenii, Rapanea neurophylla, Cassipourea elliottii, Allophylus abyssinicus,* an occasional *Olea hochstetteri* and *Ilex mitis,* and in some places *Olea chrysophylla.* At high altitudes *Cornus, Pittosporum, Xymalos, Hagenia* and *Schefflera volkensii* appear. *Wych hazel, Trichocladus malosanus* is common in some places below 8,000 feet, whilst above that altitude bamboo occurs.

The forest in the Bukwa, Suam, Kaptega, and Chepchoina valleys differs from the typical in that the Podo and the Elgon Olive in an undergrowth of *Wych Hazel* are mixed with *Maba abyssinica, Croton macrostachys, Ochna holstii,* and *Olea chrysophylla.* This sub-type probably does not go higher than 7,500 feet. The other trees of the formation of course occur.

5. *Savanna Woodland.*

This heading for the purpose of this paper covers the woody vegetation on the lower slopes of the mountain below the forest line.

In Buguishu there is exceedingly little tree growth of any sort left on the lower slopes. In recently cleared areas the protected *Malacantha* has been left. Elsewhere the trees that survive are either useless, such as figs, *Erythrina tomentosa, Cussonia spicata,* and *Spathodea nilotica;* are protected, e.g. *Albizzia coriaria,* and *Markhamia platycalyx;* or are favoured for honey production, e.g. *Garcinia buchananii, Ehretia* sp., *Croton macrostachys,* and possibly *Alangium chinense.* Fuel is obtained from fast growing herbs and shrubs, usually on fallow land. The common species are: *Vernonia amygdalina, Maesa lanceolata, Cassia didymobotrya,* and possibly *Acanthus arboreus.* Much of the fuel comes from agricultural waste.

On the rest of the mountain besides the remnants of the forest flora, chiefly along streams, there is a fire resistant savanna tree growth. At Sipi from 6,000 feet to 7,000 feet the scrub is of a wet type and the following plants are to be found: *Entada abyssinica, Acacia seyal, Ekebergia rueppelliana, Coleus barbatus, Ocimum rothii, Vangueria* sp., *Vernonia holstii, Schrebera* sp., *Acanthus arboreus, Erythrina tomentosa, Dombeya nairobensis, Cassia didymobotrya C. petersiana, C. singueana, Maesa lanceolata, Bersama engleriana, Clerodendrium johnstonii, C. rotundifolum, Sapium ellipticum, Albizzia zygia, A. gummifera, Schefflera abyssinica, Buddleja polystacyha, Ehretia* sp., *Abutilon zanzibaricum, Phytolacca dodecandra,* a candelabra *Euphorbia,* and bracken.

Corresponding with the change in the type of forest the savanna flora from Sipi to Sabei also changes. The *Entada, Sapium, Schrebera, Erythrina, Acacia seyal, Cassia petersiana* and *singueana,* and the *Ekebergia* are still represented but the following appear (6,000-7,000 feet): *Vitex cuneata, Cussonia arborea, Flacourtia hirtiuscula, Hymenodictyon floribundum, Rhus abyssinica, R. incana, Syzygium mambwaense, Combretum gueinzii* subsp. *splendens, Carissa edulis, Euclea* sp., *Faurea speciosa, Trimeria bakeri, Strychnos* sp., *Dodonea viscosa, Combretum binderanum,* and *Osyris abyssinica.*

The country gets still drier from Sabei to Kaburon (in the North-East). *Gymnosporia senegalensis, Euclea* sp., *Combretum gueinzii, Acacia seyal, Rhus incana, Hymendictyon floribundum,* the *Osyris* and *Erythrina tomentosa* are the commonest species. *Dombeya quinqueseta* appears: Cedar is to be found near Kaburon; and also there near the forest line the flat topped *Acacia lahai* is a feature of the landscape.

From Kaburon to Kyesoweri between 6,000 and 7,000 feet the country becomes a little wetter. *Celtis kraussiana* and *Podocarpus gracilior* appears in some of the valleys, and *Cordia abyssinica, Croton macrostachys, Maesa lanceolata,* and *Coleus barbatus* are common in the grasslands, mixed with typical species such as *Combretum gueinzii, Cassia singueana, Rhus incana, R. abyssinica, Acacia seyal,* and the *Entada, Erythrina,* and the *Hymenodictyon.*

The savanna along the East of the mountain below the forest line from Bukwa southwards is fairly constant. The commonest species are: *Combretum gueinzii* subsp. *splendens, C. binderanum, Terminalia spekei, Cassia singueana, Acacia seyal, A. macrothyrsa, Heeria reticulata, Entada abyssinica, Gymosporia senegalensis, Croton macrostachys, Dombeya quinqueseta, Lannea barteri, Bauhinia thonningii, B. fassoglensis, Rhus in-*

cana, R. natalensis, and less commonly *Faurea speciosa, Protea madiensis,* and *Ximenia americana.*

On the South the land slopes away to the warmer and wetter N. Kavirondo country and the typical Eastern Province of Uganda savanna becomes dominant. This flora is not markedly different from the preceding one. *Combretum binderanum, C. gueinzii* subsp. *splendens, Terminalia spekei, Vitex cuneata,* and *V. fischeri* are perhaps the commonest trees, and the following are represented: *Cussonia arborea, Steganotaenia araliacea, Rhus incana, Stereospermum kunthianum, Heeria reticulata, Grewia* spp., *Bauhinia thonningii, Flueggia microcarpa, Annona chrysopylla, Lannea barteri, Erythrina tomentosa, Euphorbia tirucalli, Bridelia ferruginea, Gymnospria senegalensis,* and *Gardenia jovis-tonantis.*

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